



Developing a Prioritization Protocol for Munitions Response Sites

Overall Construct Diagram,
Explosive Hazard Evaluation Module,
Chemical Warfare Materiel Hazard Evaluation
Module, and Relative Risk Site Evaluation
Module



Background



September
16, 2002

Congressional Requirement

- ▶ Section 311 of FY02 Defense Authorization Act
 - Develop, in consultation with States and Indian Tribes, a proposed protocol for assigning to each “defense site” a relative priority for response activities related to unexploded ordnance, discarded military munitions, and munitions constituents
 - “Defense sites” are locations not on an operational range where a munitions response is needed
 - Issue proposed protocol for public comment by November 30, 2002
 - Issue final protocol
 - Apply to sites in munitions response site inventories



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DoD Objectives

- ▶ Develop, in consultation with EPA, States, and Indian Tribes, a prioritization protocol for activities at munitions response sites
 - The protocol should:
 - Use consistent factors, terminology and definitions
 - Address safety, environmental hazards, and other pertinent management factors
 - Allow for consistent application
 - Provide a proposed prioritization protocol for public comment by November 30, 2002
- ▶ Develop and provide training on the final protocol
- ▶ Apply to munitions-response sites in the initial inventory required by May 31, 2003



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Factors for Consideration

- ▶ In assigning a relative priority to a site, DoD is to, “primarily consider factors relating to safety and environmental hazard potential,” such as* :
 - Presence of known or suspected unexploded ordnance, discarded military munitions, or munitions constituents
 - Types of munitions or munitions constituents
 - Presence/effectiveness of public access controls
 - Potential/evidence of direct human contact
 - Status of any response actions
 - Date for transfer from military control
 - Extent of documented incidents
 - Potential for drinking water contamination or release into the air
 - Potential for damage to natural resources

*Factors are paraphrased for brevity.



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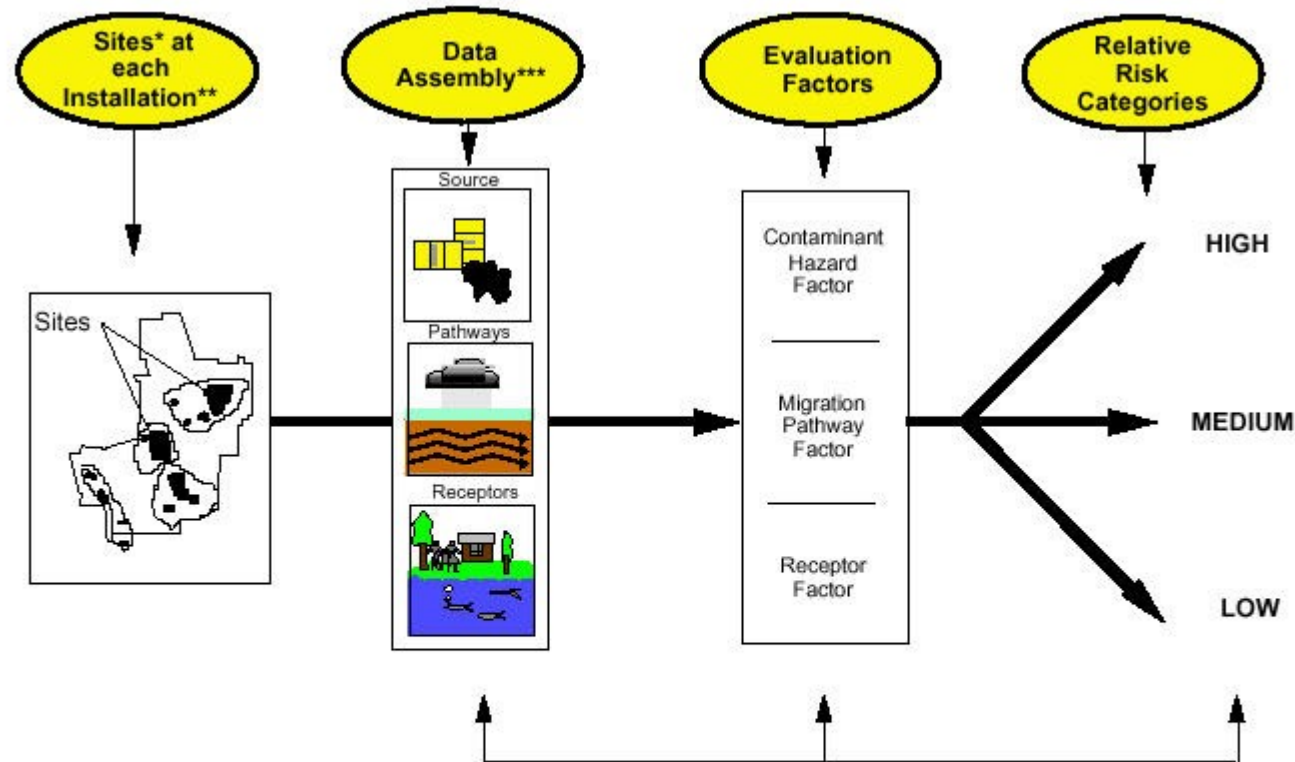
Current DoD Policy - **Priority Setting and Sequencing**

- ▶ DERP Management Guidance, Section 16, Priority setting and sequencing
 - Prioritization and sequencing of environmental restoration activities is accomplished using the frameworks described in the *DoD Relative-Risk Site Evaluation (RRSE) Primer* and the *Risk Assessment Code (RAC)*, other risk information, and other management factors
 - In prioritizing and sequencing environmental restoration activities, other risk information and other management factors do not influence the high, medium, or low RRSE or RAC score, or risk assessment results, but may influence the site's priority for funding
 - Generally sites that present a greater relative-risk to human health, safety, or the environment will be addressed before sites that present a lesser risk



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Relative-Risk Site Evaluation Concept Summary



*Sites for current DoD installations
equate with "Projects" in the Formerly
Utilized Defense Sites (FUDS)
Program

**Installations equate with "properties"
in the FUDS Program

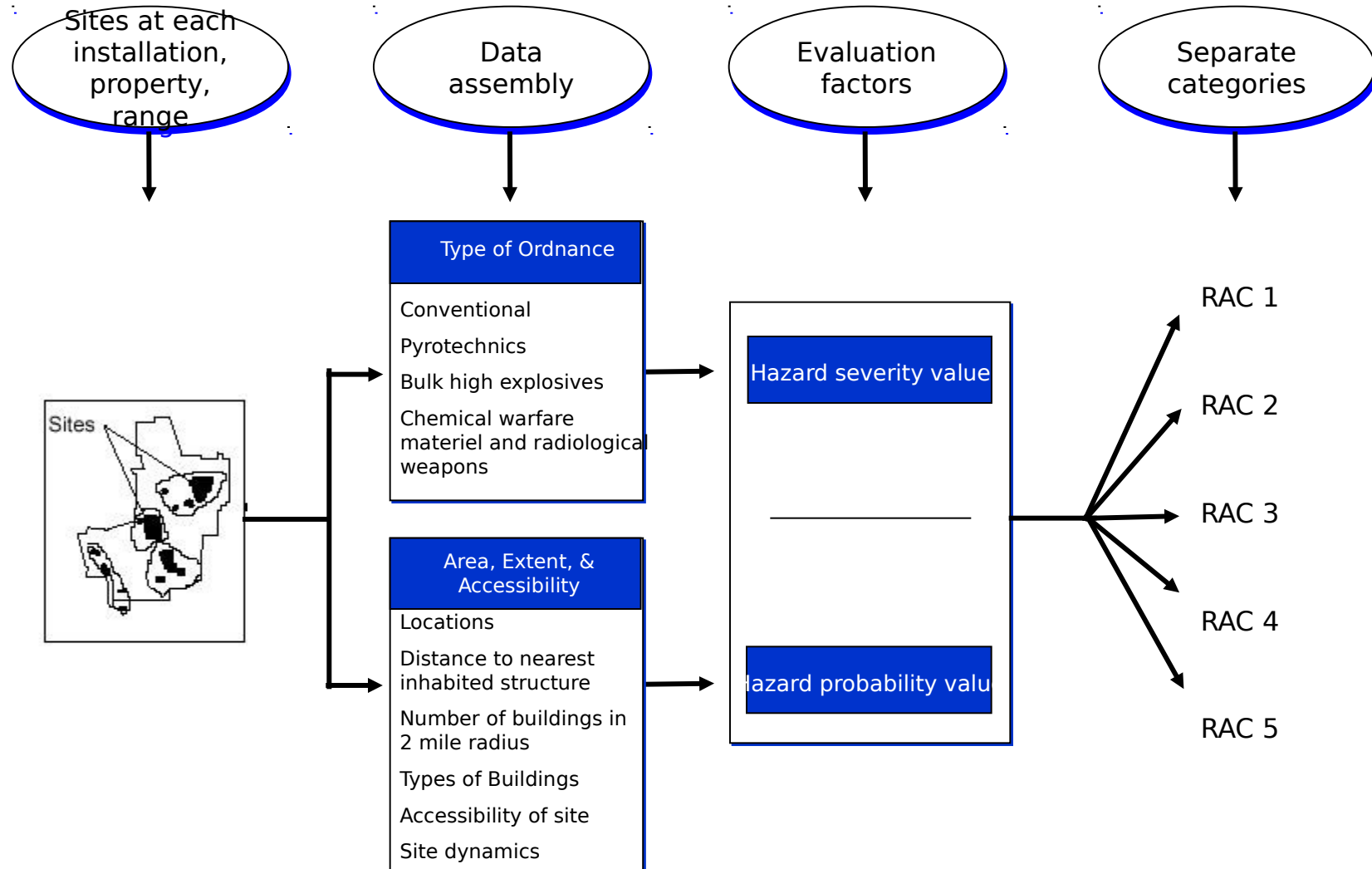
***Data assembled by environmental
medium

Regulator and Public Stakeholder Involvement
in Technical Evaluations



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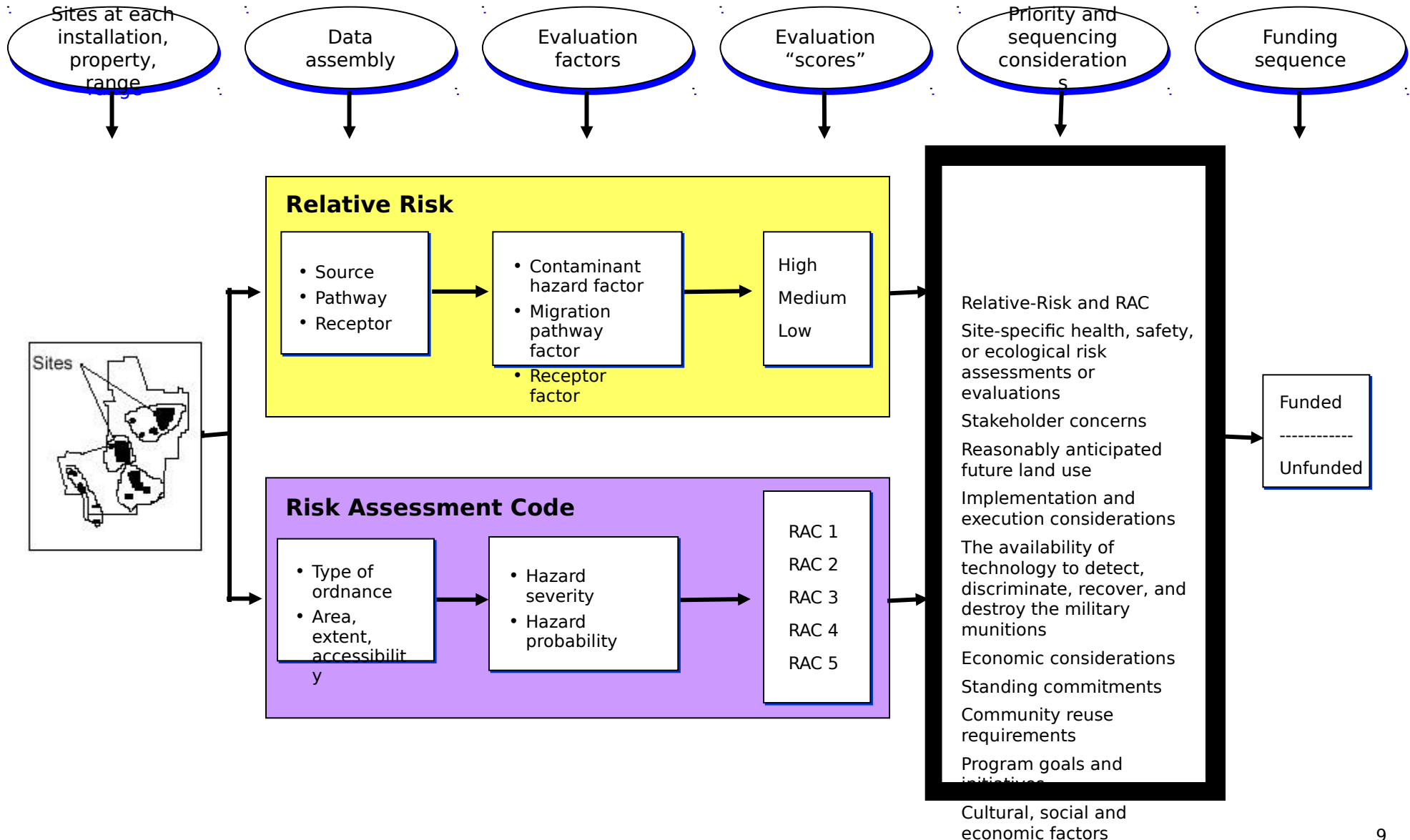
Risk Assessment Code Concept Summary





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Current DoD Priority Setting and Sequencing Concept Summary



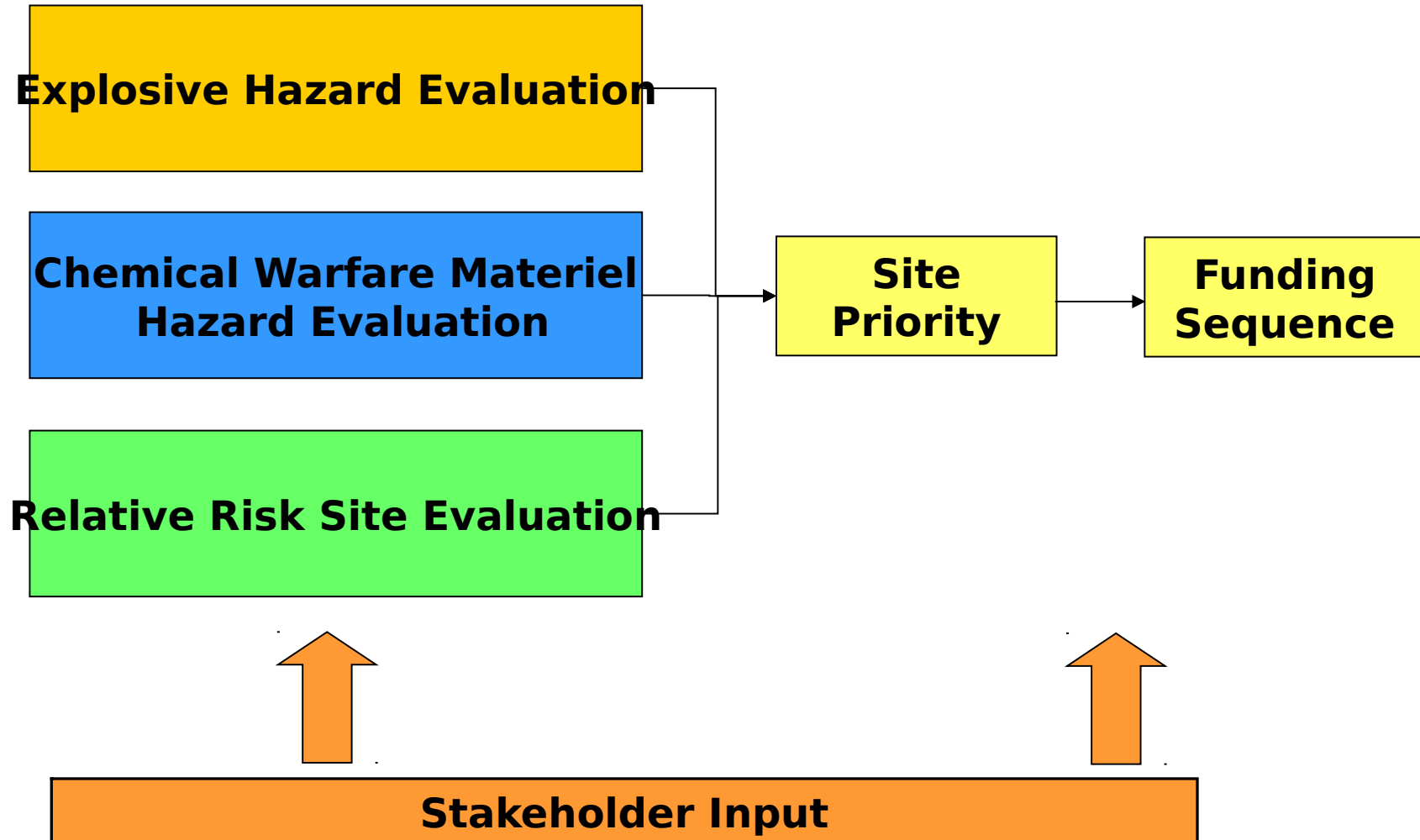


Concept for Overall Protocol Structure



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Overall Protocol Structure



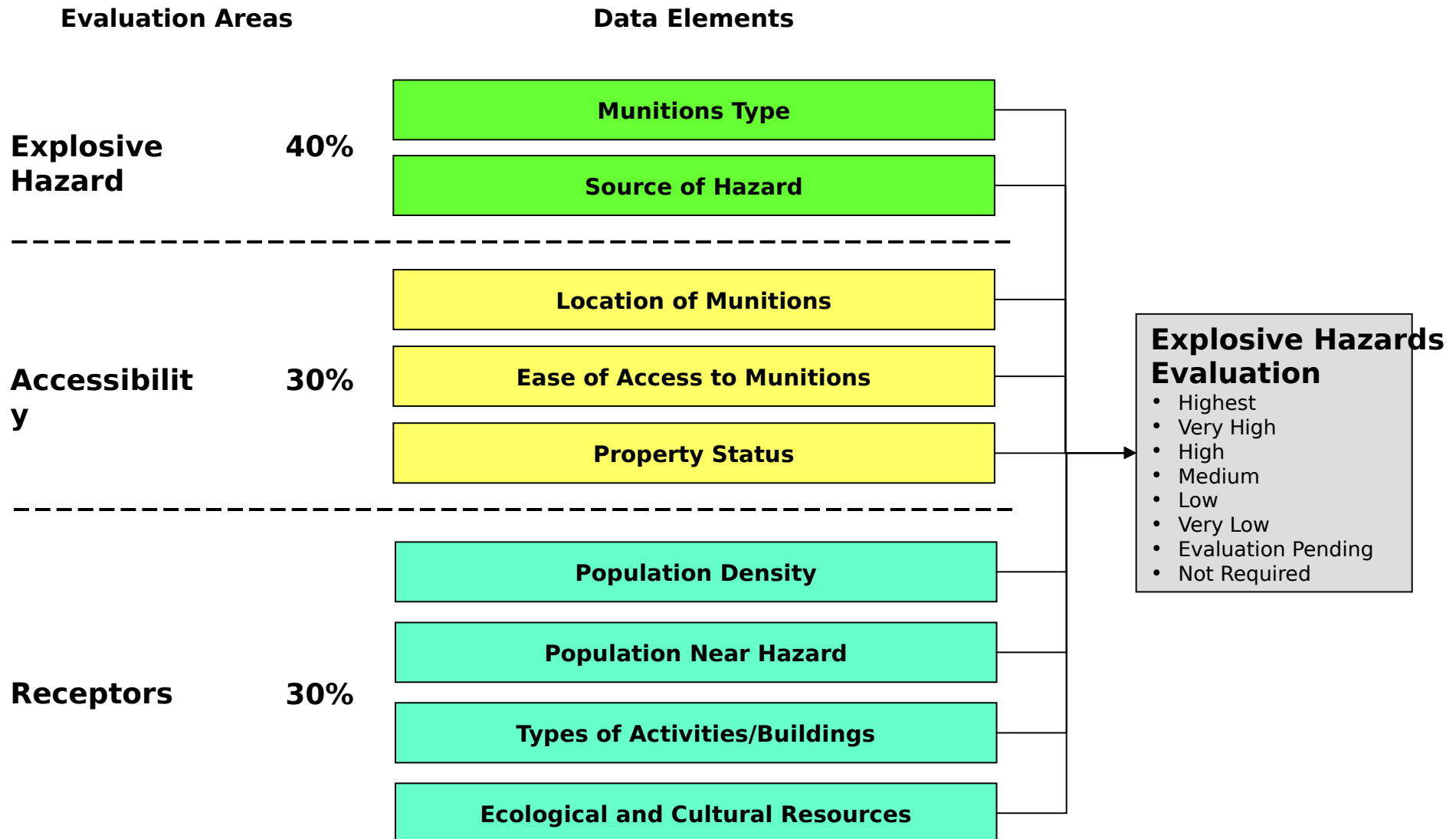


Concept for the Explosive Hazard Evaluation Module



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Explosive Hazard Evaluation (EHE)





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Explosive Hazard Evaluation (EHE)

Explosive Hazard

Munitions Type 30	
• Sensitive	30
• High explosive	25
• Propellant	15
• Pyrotechnics	20
• Bulk HE, pyrotechnics, or propellant	10
• Practice	5
• Riot control	3
• Small arms	1

Source of Hazard 10	
• Ranges	10
• OB/OD	6
• Burial Pits	5
• Manufacturing	3
• Small Arms Range	1

Accessibility

Location of Munitions 15	
• Known Surface	15
• Known Subsurface, active	10
• Known, Subsurface, stable	5
• Suspected	5
• Subsurface, barrier in place	1

Ease of Access to the Munitions 10	
• No barrier	10
• Barrier is incomplete	8
• Barrier	6
• Security Guard, but no barrier	4
• Isolated site	2
• 24-hour surveillance	0

Property Status 5	
• Non-DoD control	5
• DoD control	1

Explosive Hazard Evaluation

Total Score from all elements

- Highest > 90
- Very high 80 - 90
- High 70 - 79
- Medium 60 - 69
- Low 45 - 59
- Very low < 45
- Evaluation Pending
- Not Required

Receptors

Population Density (people/sq mi) 10	
• > 500	10
• 100 - 500	8
• < 100	6

Population near Hazard (inhabited buildings within a 2-mile radius) 10	
• 26 or more buildings	10
• 16 to 25	8
• 11 to 15	6
• 6 to 10	4
• 1 to 5	2
• 0	0

Types of Activities/Buildings (within a 2-mile radius) 5	
• Residential, educational, etc.	5
• Industrial, warehouse, etc.	4
• Agricultural, forestry, etc.	3
• Detention, correctional, hiking	2
• No activity or buildings	0

Ecological and Cultural Resources 5	
• Yes	5
• No	0



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EHE Definitions

► Munitions Type

- **Sensitive** – This category of munitions includes items that are by their design/failure modes most likely to function upon interaction with exposed personnel. These items may include, but are not limited to, sub-munitions, clustered munitions (bomblets), 40mm grenades, High explosive anti-tank (HEAT) munitions, munitions with phosphorous and hand grenades.
- **High Explosive** – Any munition containing a high explosive filler (e.g., RDX, Comp B)
- **Practice** – Any munition containing only a spotting charge (e.g., a small charge of white phosphorus used for marking points of impact)
- **Propellant** – Any munition or munitions component (e.g., rocket motors) containing only a propellant (e.g., single, double, triple-based propellant)
- **Pyrotechnic** – Any munitions (e.g., flares, signals, simulators, smoke grenades) containing pyrotechnic fillers other than phosphorous
- **Bulk Propellant** – Any propellant (e.g., single, double, triple-based propellant) not contained in a munition
- **Bulk Pyrotechnic** – Any pyrotechnic material not contained in a munition
- **Bulk explosives** – Demolition charges (e.g., C4 blocks) or concentrated mixtures in soil, such that the soil is explosive (explosive soil)
- **Riot control** – Any munition containing riot control agent (e.g., tear gas)
- **Small arms** – Any unused small arms (<.50 caliber) ammunition



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EHE Definitions

▶ Source of Hazard

- **Ranges** — Non-operations areas (i.e., where a decision has been made to close the range, or the area has been put to a use incompatible with range activity) where training operations involving munitions were conducted; includes target areas, maneuver areas, buffer zone, and safety fan
- **Open Burning/Open Demolition (OB/OD) Units** — Areas where munitions and propellants were burned or detonated for the purpose of treatment or disposal
- **Burial Pits** — Areas where munitions or munitions-related debris were buried as means of disposal
- **Manufacturing** — Areas where munitions were manufactured
- **Small Arms Ranges** — Ranges where small arms (< .50 caliber) were used

▶ Location of Munitions

- **Confirmed Surface** — Physical evidence of the presence of munitions (e.g., UXO, discarded or abandoned munitions) that is exposed above the ground or water surface or exposed to air by natural phenomenon (e.g., mean low tide, drought, erosion)
- **Confirmed Subsurface, Active** — Physical evidence of the presence of munitions that is fully under the ground surface or submerged in an area where the munitions are likely to be exposed or moved
- **Confirmed Subsurface, Stable** — Physical evidence of the presence of munitions that is fully under the ground surface or submerged in an area where the munitions are not likely to be exposed or moved
- **Suspected** — Any evidence, other than the physical presence of munitions, that suggests the potential presence of munitions (e.g., munitions fragments, components of a munition, written documentation of the presence of munitions, reports, records)
- **Subsurface, Barrier in place** — Physical evidence of the presence of munitions that is fully under the ground surface or submerged and cannot be accessed due to a physical control (e.g, pavement)



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EHE Definitions

▶ Ease of Access

- **No Barrier** — No physical means for controlling entry
- **Barrier is incomplete** — Barrier is incomplete (e.g., in disrepair or does not completely surround the site). Barrier is intended to deny egress from the site, as a barbed wire fence for grazing. Very dense vegetation or rugged terrain on part of the site
- **Barrier** — A barrier (any kind of fence in good repair) but no separate means to control entry. Barrier is intended to deny access to the site. Very dense vegetation or rugged terrain on all sides
- **Security Guard but no barrier** — Human surveillance but no physical means for controlling entry
- **Isolated Site** — Site where access is controlled due to its remote location
- **24-Hour Surveillance** — A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel continuously monitors and controls entry); or, an artificial or natural barrier (e.g., fence combined with a cliff) that completely surrounds the area; and, a means to control entry at all times through the gates or other entrances (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the area).

▶ Property Status

- **Non-DoD Control** — Site is owned and managed by a non-DoD entity
- **DoD Control** — Site is owned and managed by DoD



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EHE Definitions

▶ Types of Activities/Buildings

- Residential, educational, child care, residential, hospitals, hotels, commercial, shopping centers, play grounds, community gathering areas, religious sites, critical assets
- Industrial, warehouse
- Agricultural, forestry
- Detention, correctional, hiking, hunting
- No buildings

▶ Ecological and Cultural Resources (Sites with one or more resources)

- **Threatened and Endangered Species/Critical Habitat** – A recognized threatened or endangered species is present or the site is designated as critical habitat for such a species
- **Sensitive Ecosystems** – e.g., Wetland, breeding grounds
- **Natural/Cultural Resources** – Recognized and identified natural (e.g., mineral deposits) or cultural resources (e.g. Native American religious sites)

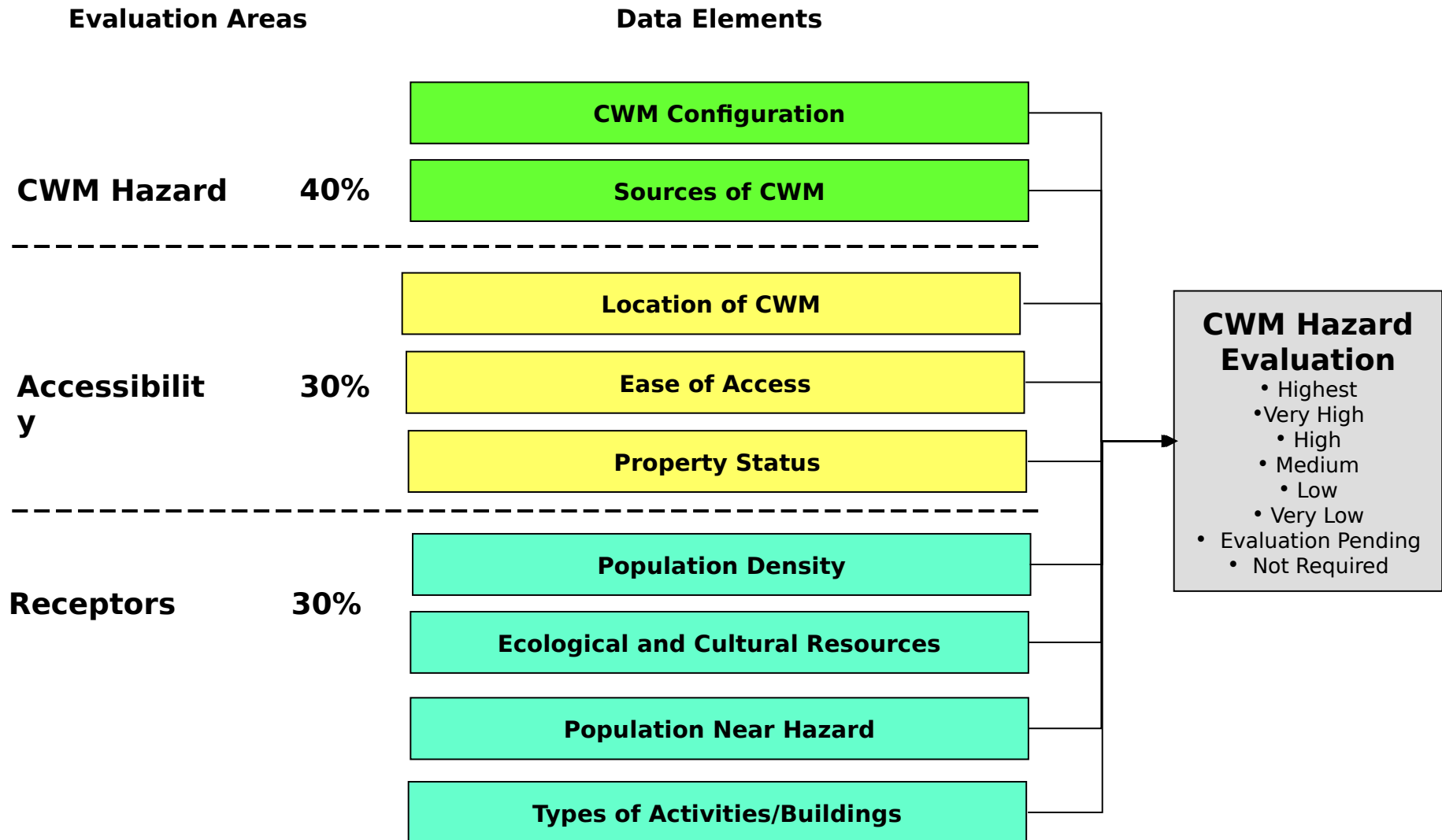


Chemical Warfare Materiel Hazard Evaluation Module



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CWM Hazard Evaluation (CHE)





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CWM Hazard Evaluation (CHE)

CWM Hazard

Evaluation

(Total Score from all
elements)

CWM Hazard

CWM Configuration 30

- Chemical, explosive configuration (used or treated)

30

- CWM mixed with UXO

25

- Chemical, explosive configuration (unused)

20

- Bulk CWM (containerized or in non-explosively configured munition)

15

- CAIS (chemical agent identification sets)

5

Location of CWM 15

- Confirmed Surface 15
- Confirmed Subsurface, active 10
- Confirmed Subsurface, stable 5
- Suspected 5
- Subsurface, barrier in place 1

Accessibility

Ease of Access to the CWM 10

- No barrier 10
- Barrier is incomplete 8
- Barrier 6
- Security Guard, but no barrier 4
- Isolated site 2
- 24-hour surveillance 0

Property Status 5

- Non-DoD control 5
- DoD control 1

Population Density (people/sq mi) 10

- > 500 10
- 100 - 500 8
- < 100 6

Ecological and Cultural Resources 5

- Yes 5
- No 0

Types of Activities/Buildings (within a 2 mile radius) 5

- Educational, child care, residential 5
- Industrial, warehouse, etc. 4
- Agricultural, forestry, etc.

Population near Hazard (inhabited buildings within a 2-mile radius) 10

- 26 and over 10
- 16 to 25 8
- 11 to 15 6
- 6 to 10 4
- 1 to 5 2
- 0 0

- Highest
- >90
- Very high
- 80-90
- High
- 70-79
- Medium
- 60-59
- Low
- 45-59
- Very low

< 45

Population near Hazard

(inhabited buildings within a 2-mile radius) 10



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CHE Definitions

▶ CWM Configuration

- **Chemical, explosive configuration (used or treated)** — Any explosively configured munition containing chemical warfare materiel filler that has been used (e.g., in training, testing) or has been treated by burning or other means
- **CWM mixed with UXO** — Any chemical warfare materiel that is co-mingled with UXO
- **Chemical, explosive configuration (unused)** — Any explosively configured munition containing chemical warfare materiel filler that has NOT been used (e.g., in training, testing) or has NOT been treated by burning or other means
- **Bulk CWM (containerized or in a non-explosively configured munition)** — Any chemical warfare materiel that is in a container or in a non-explosively configured munition, but NOT a CAIS
- **Chemical Agent Identification Set (CAIS)**
 - Sniff sets that contain agents or industrial chemicals impregnated on charcoal
 - Pyrex® tubes of either pure agent, pure industrial chemicals, agent in a chloroform solution, or industrial chemicals in a chloroform solution
 - Containers of pure mustard agent



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CHE Definitions

► Sources of CWM

- **Live-fire with agent filler** — A range or other activity that supported live-fired agent-filled munitions
- **Burial site unused, treated** — A burial of CWM items that has been explosively treated
- **Burial site unused, untreated** — A burial of CWM items that has NOT been explosively treated
- **Production facility** — Facilities that are involved in the manufacture of CWM items
- **Regulated or industrial disposal or demilitarization** — Locations where chemical agents were treated in a RCRA-permitted or interim status treatment unit
- **RDT&E (Research, Development, Testing, and Evaluation)**
 - **Research facility** — A facility that was involved in the RDT&E activities that involved test use (to include live-fire) of CWM items for evaluation of performance
 - **Static testing** — Any activity that evaluated CWM items by causing them to function on a static test pad (non-live fire)
- **Individual soldier training**
 - **Liquid agent training** — Training activities that involved the use of non-explosively configured CWM, primarily using CAIS
 - **Decontamination training** — Training of soldiers in decontamination practices using agent contaminated property
- **Storage of CWM** — Any storage facility or structure
- **Transfer operations** — Temporary storage facilities involved in the shipping of materiel



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CHE Definitions

▶ Location of CWM

- **Surface** — CWM that is exposed above the ground or water surface or exposed to air by natural phenomenon (e.g., mean low tide, drought, erosion)
- **Subsurface, active** — CWM that is fully under the ground surface or submerged in an area where the munitions are likely to be exposed or moved
- **Subsurface, stable** — CWM that is fully under the ground surface or submerged in an area where the munitions are not likely to be exposed or moved
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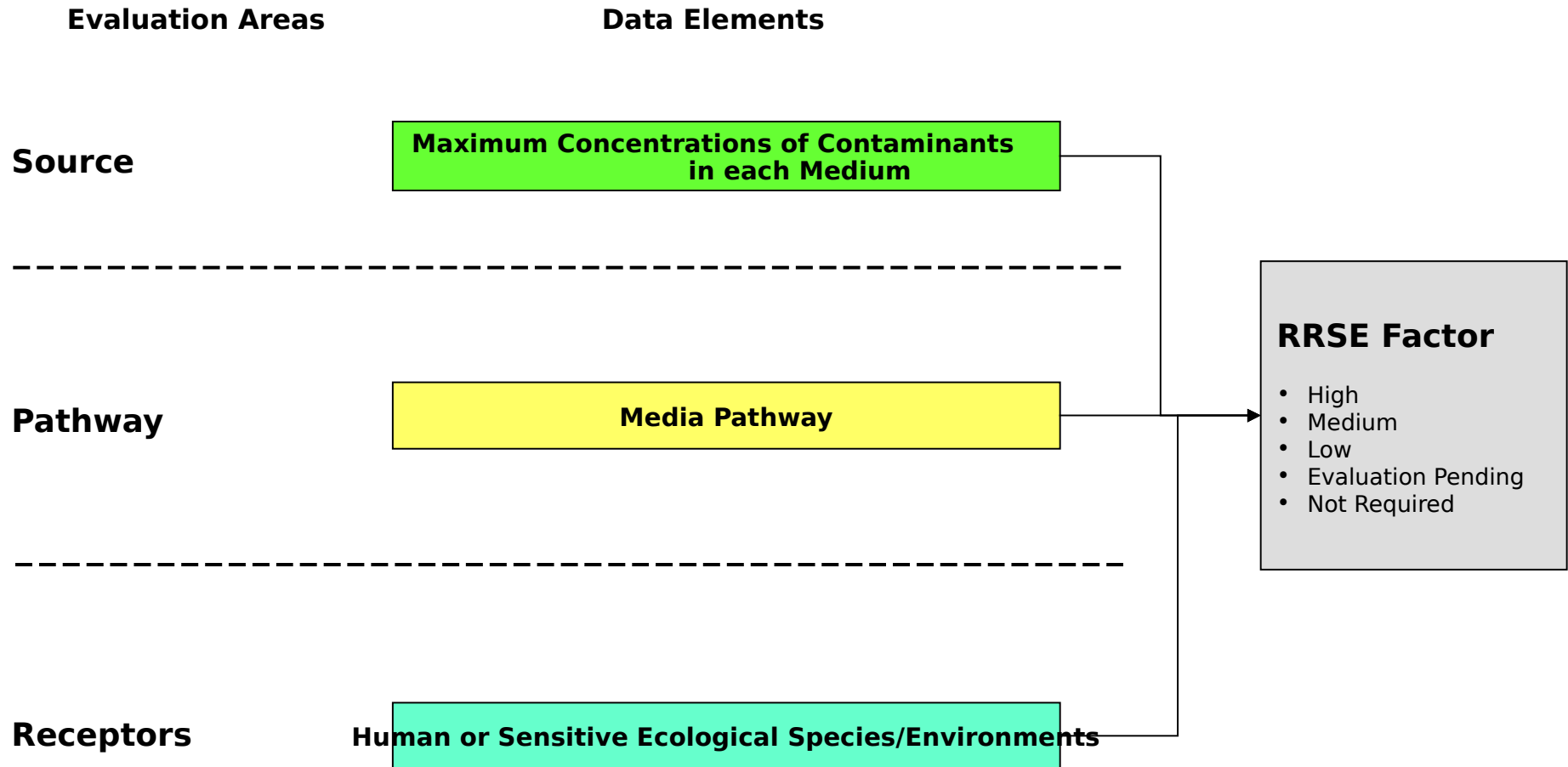
Relative Risk Site Evaluation Module





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Relative Risk Site Evaluation (RRSE)





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Overall RRSE Evaluation

Concentration of Contaminant

- Significant: CHF > 100
- Moderate: 2 - 100
- Minimal: CHF < 2

Media Pathway

- Evident
- Potential
- Confined

Human or Sensitive Ecological Species/ Environments

- Identified
- Potential
- Limited

Overall RRSE Factor

		Receptor Factor	Migration Pathway Factor		
			Evident	Potential	Confined
Contaminant Hazard Factor	Significant	Identified	High	High	Medium
		Potential	High	High	Medium
		Limited	Medium	Medium	Low
	Moderate	Identified	High	High	Low
		Potential	High	Medium	Low
		Limited	Medium	Low	Low
	Minimal	Identified	High	Medium	Low
		Potential	Medium	Low	Low
		Limited	Low	Low	Low

RRSE Factor

- High
- Medium
- Low
- Evaluation Pending
- Not Required



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RRSE Definitions

▶ Maximum Concentrations of Contaminants in each Medium

- **Significant** — Sum of ratios (maximum concentration/comparison value) is greater than 100
- **Moderate** — Sum of ratios (maximum concentration/comparison value) is 2 to 100
- **Minimal** — Sum of ratios (maximum concentration/comparison value) is less than 2

▶ Media Pathway

- **Evident** — Analytical data or observable evidence indicates that contamination in the media is present at, is moving toward, or has moved to a point of exposure
- **Potential** — Contamination in the media has moved only slightly beyond the source (i.e., tens of feet), could move but is not moving appreciably, or information is not sufficient to make a determination of Evident or Confined
- **Confined** — Low possibility for contamination in the media to be present at or migrate to a point of exposure

▶ Human or Sensitive Ecological Species/Environments

- **Identified** — Identified receptors have access to contaminated media
- **Potential** — Potential for receptors to have access to contaminated media
- **Limited** — Little or no potential for receptors to have access to contaminated media



Combining the EHE, CHE, and RRSE

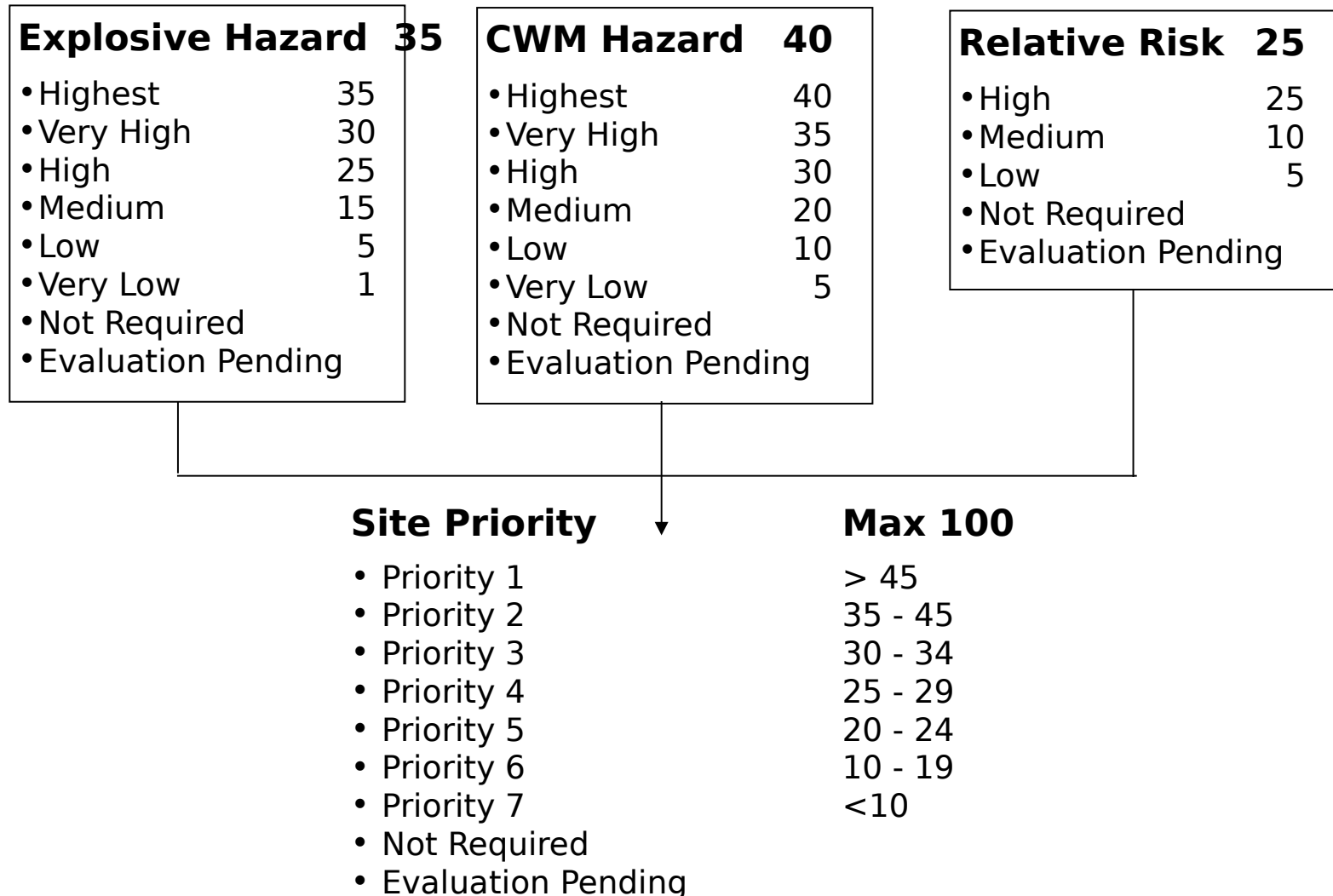
- ▶ Reaching the Overall Hazard Priority for the Site



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EHE, CHE, and RRSE Evaluations Combined

Concept 1: Scoring Model





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EHE, CHE, and RRSE Evaluations Combined

Concept 2: Select the Highest Priority (lowest number)

Explosive Hazard	CWM Hazard	Relative Risk
	• Highest 1	
• Highest 2	• Very High 2	• High 2
• Very High 3	• High 3	
• High 4	• Medium 4	
• Medium 5	• Low 5	• Medium 5
• Low 6	• Very Low 6	
• Very Low 7		• Low 7
• Not required • Evaluation pending	• Not required • Evaluation pending	• Not required • Evaluation pending

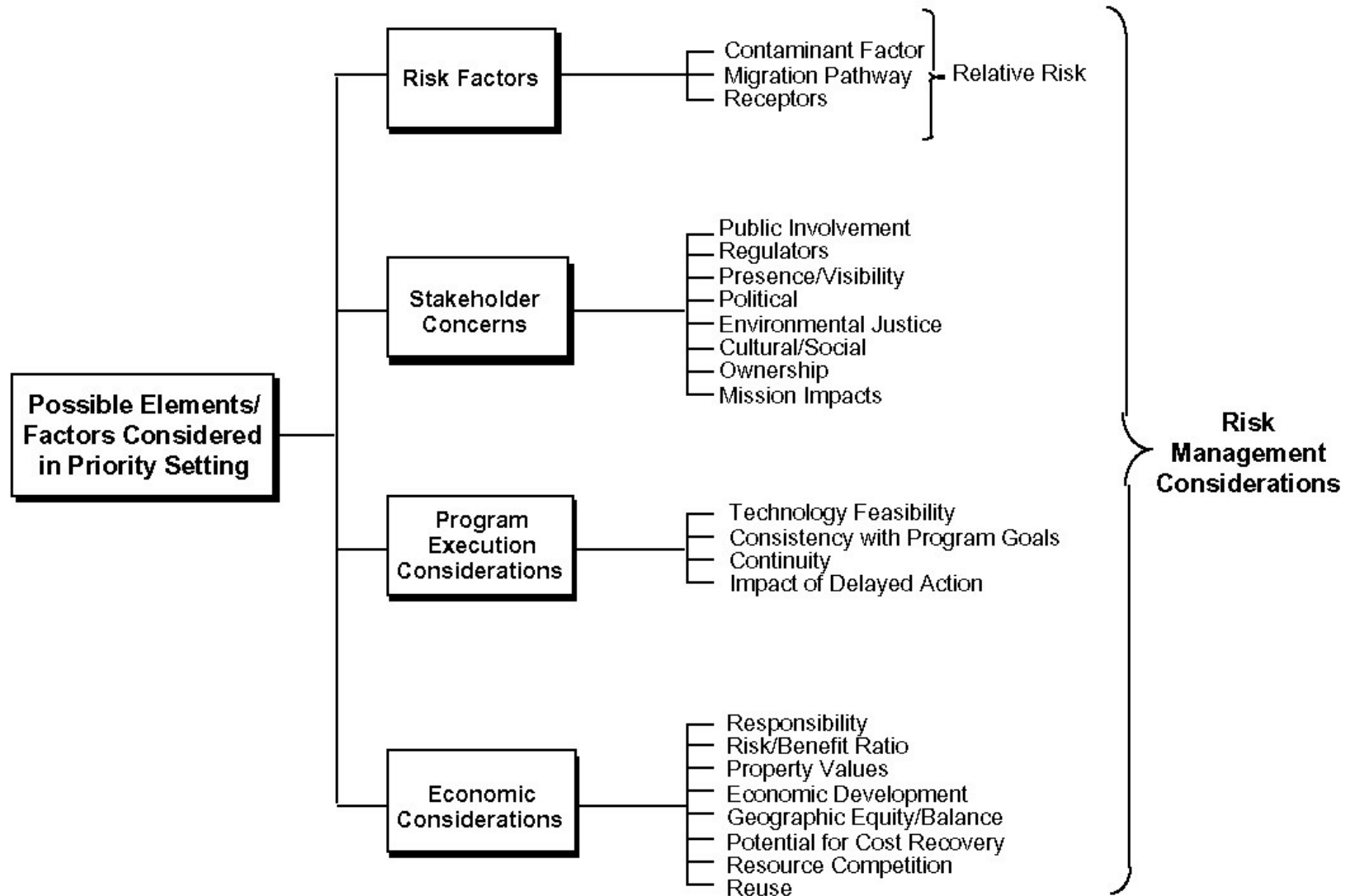


Other Considerations in Sequence Setting



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Other Considerations' Role in Sequence Setting





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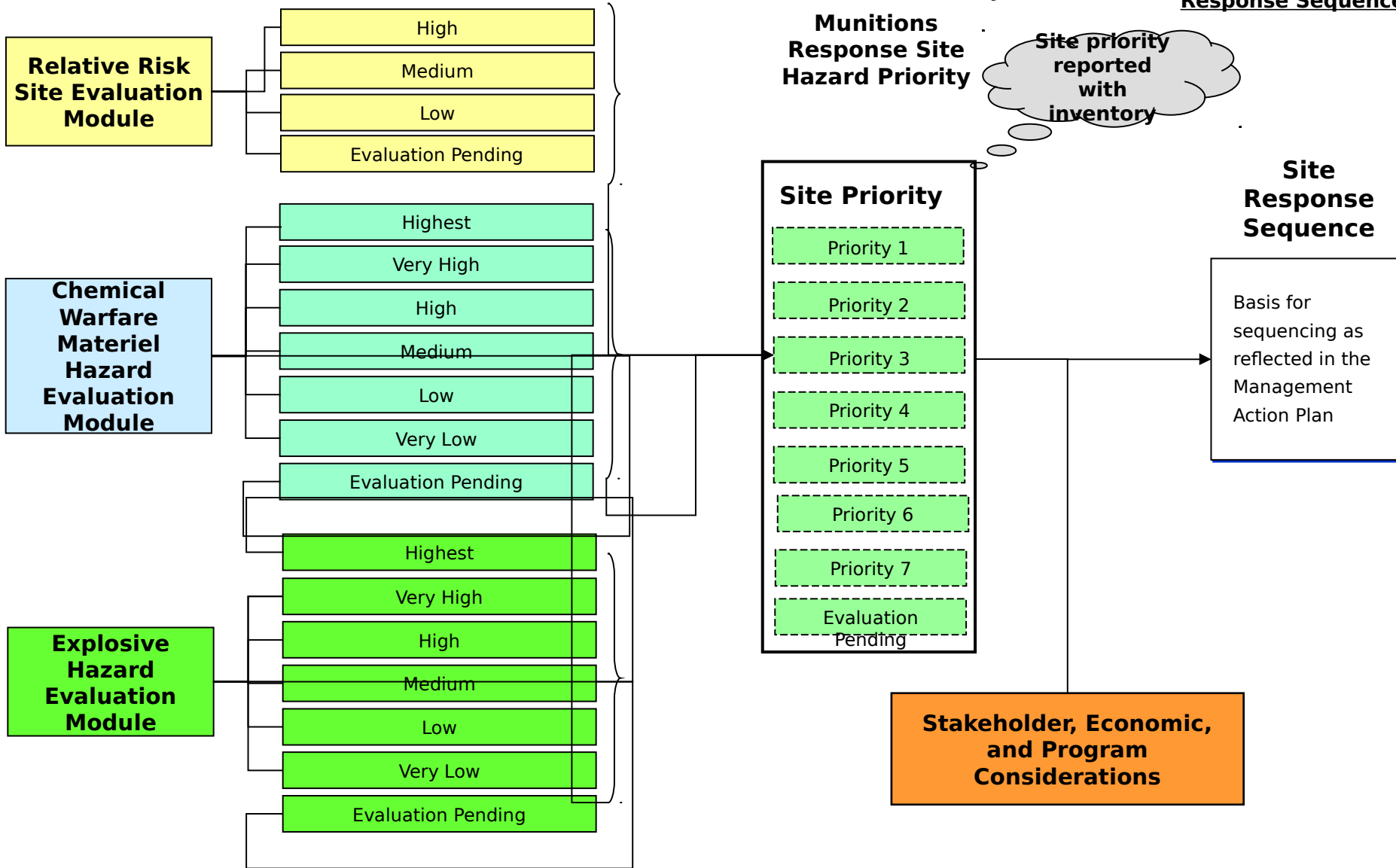
Overall Protocol Structure

Evaluation Modules

Hazard Rating Categories

Overall Hazard Priority

Response Sequence





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Discussion

- ▶ **Comments?**
- ▶ **Questions?**
- ▶ **Concerns?**

Additional information is available at:

<https://www.denix.osd.mil//MMRP>